

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NATIONAL APPLIED RESOURCE SCIENCES CENTER
DENVER FEDERAL CENTER, BUILDING 50
P. O. BOX 25047
DENVER, COLORADO 80225-0047

In Reply Refer To:
1703 (RS-130)P

October 29, 1997

EMS TRANSMISSION: 10/29/97
Information Bulletin No. RS-98-012

To: All Field Officials
From: Director, National Resource Sciences Center
Subject: Knapweed as a Carcinogen

Recently, BLM employees received emails concerning a case of dermal exposure to knapweed and purported to cause benign tumors. Our Toxicologist, Dr. Karl Ford, has researched the topic and concluded that while knapweed does appear to be poisonous to livestock which ingest sufficient amounts of knapweed, there is no evidence that dermal exposure to knapweed causes cancer. However, to avoid dermal reactions to knapweed or any other noxious weed, as a precaution, gloves should be worn in handling the plant.

Before discussing knapweed specifically, it is important to note that **many plants are poisonous** in one way or another. Some plants are poisonous on ingestion to livestock or humans. Other plants cause inflammation (irritation or dermatitis) on contact. The physical type from spines is called either skin irritation or is sometimes called contact dermatitis; whereas the chemical type via allergy or sensitization (e.g., poison ivy, poison oak) is called allergic contact dermatitis. Plants have evolved these defenses as a means of protection. Therefore, it is not unusual to observe injury from contact with certain plants. However, it is unusual to associate tumors with contact from plants.

Knapweed belongs to the genus *Centaurea*. Most of the toxicology literature available on this genus applies to the Russian knapweed, *Centaurea repens*. This plant contains a pharmacologically active chemical complex called repin, a member of the family called more generally as sesquiterpene lactones (SQLs). These SQLs have been found in many plants (e.g., the poisonous range plants bitterweed, smallhead sneezeweed, yellow starthistle) and have been responsible for severe losses of grazing livestock. Also, SQLs are found in liverworts, ragweed and chrysanthenums. After poison ivy and poison oak, SQLs account for most cases of allergic human contact

dermatitis. Unlike poison ivy, which sensitizes a large part of the population, even those who appear to have casual contact, plants containing SQLs require long and intimate contact before sensitization occurs.

When ingested by horses, repin from Russian knapweed has been associated with a movement disorder and encephalomalacia simulating Parkinson's disease. Repin has been found to be toxic to animal brain cells. Interestingly, several SQLs related to repin have been demonstrated to be effective anti-tumor agents, indicating promise as chemotherapeutic agents in the treatment of cancer.

Knapweed occurs throughout the west in species such as spotted knapweed, diffuse knapweed, and Russian knapweed. These are exotic, aggressive, noxious, weedy species and, as such, are subject to weed control by BLM and other agencies. One common control method is hand pulling so as to remove the roots and effectively kill the plant.

As a matter of course, any BLM personnel pulling weeds are advised to wear leather work gloves to protect the hands from abrasions and blisters. Knapweed and other weeds typically have spines or other defenses to protect them and wearing gloves will protect personnel from physical and chemical injury from noxious or poisonous plants.

In summary, while knapweed does appear to be poisonous to livestock which ingest sufficient amounts of knapweed, there is no evidence that dermal exposure to knapweed causes cancer. Please contact Karl Ford at 303-236-6622, if you have any questions on this subject.

Signed:
Lee Barkow
Director, National Applied Resource
Sciences Center

Authenticated:
Elsie Pacheco
Staff Assistant

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